extent tobacco use and lung cancer mortality will be further reduced during the next half century due to control efforts that have already been implemented until 2015. To address this question, we developed simulation models that explicitly relate smoking temporal patterns to future lung cancer rates. **Method:** Four independent lung cancer natural history models were developed using US smoking (1964-2015) and lung cancer mortality (1969-2010) data. Each model projected lung cancer mortality by smoking status (ages 30-84) from 2015 to 2065 under a status quo scenario, in which current smoking patterns are assumed to continue into the future. Sensitivity analyses were conducted comparing optimistic and pessimistic assumptions relative to the status quo. **Result:** Models validated well to observed lung cancer mortality. Under the status quo scenario, age-adjusted lung cancer mortality is projected to drop 79% from 2015 to 2065. Concomitantly, the annual number of lung cancer deaths is projected to decrease from 135,000 to 50,000 (63% reduction). Despite these decreases, 4.4 millions deaths from lung cancer are projected to occur in the US from 2015-2065. **Conclusion:** Tobacco control efforts since the 1960's will continue to lead to reductions in lung cancer rates well into the next half century. Nonetheless, additional prevention efforts are required to sustain and expand these gains, and further reduce the lung cancer burden in the US.

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Molecular Alterations and Estimated Indoor Radon in NSCLC Patients from the French National Cancer Institute Registry: Radon France Study

L. Mezquita,[1] F. Barlesi,[2] E. Auclin,[3] D. Planchard,[1] A. Botticella,[4] A. Gazzah,[5] P. Lavaud,[1] F. Aboubakar Nana,[1] C. Lepéchoux,[4] B. Besse[1] [1]*Medical Oncology Department, Gustave Roussy, Villejuif/FR,* [2]*Assistance Publique Hôpitaux de Marseille, Aix-Marseille University, Marseille/FR,* [3]*Medical and Gastrointestinal Oncology Department, Georges Pompidou Hospital, Paris, France, Georges Pompidou Hospital, Paris/FR,* [4]*Radiation Oncology Department, Gustave Roussy, Villejuif/FR,* [5]*Early Drug Development Department, Gustave Roussy, Villejuif/FR*

Background: Radon is a radioactive gas, considered the leading cause of lung cancer in non-smokers. We assessed the correlation between the radon exposure areas in France and the molecular alterations nationally registered in non-small cell lung cancer (NSCLC) patients. **Method:** We retrospectively collected all NSCLC tested for *EGFR*, *BRAF*, *HER2* and *KRAS* mutations (m) and *ALK* and *ROS1* rearrangements (r) on the 28 French Plateform led by INCa (French National Cancer Institute). The prevalence of molecular alterations by region was correlated to the indoor radon risk area based on the official French (*Institut de Radioprotection et de Sûreté Nucléaire,* INSN, France). Paris and its region Ile-de-France were not included in this analysis due to its high rate of patients that are native from other regions. **Result:** 116.424 NSCLC were included. Overall, KRAS was positive in 27,7% (27.314/98.522), EGFR in 11,27% (13.125/116.424), ALK in 3,2% (2.928/91.291), BRAF in 2,3% (2.419/105.919), ROS1 in 1,12% (373/33.222) and HER2 in 0,8% (816/97.749) of all cases. We stratified the French regions in 3 areas based on their exposure to radon: high (Auvergne-Rhône-Alpes, Bretagne, Normandie, Pays de la Loire), intermediate (Bourgogne-Franche-Comté, Nouvelle Aquitaine, Occitanie, Provence-Alpes-Cote-d'Azur) and low explosure (Centre Val-de-Loire, Grand Est, Hauts de France). The prevalence of driver alterations (*EGFR, BRAF, HER2* and *ROS1* were significantly higher in high exposure area. The prevalence of *KRAS* mutations was significantly higher in low exposure area. **Conclusion:** NSCLC molecular alterations that are linked to low tobacco consumption were higher in the French region with high radon exposure. Role of the radon in lung cancer carcinogenesis of specific molecular subtypes should be further explored. **Keywords:** radon, NSCLC, molecular drivers

	Low risk	Intermediate	High	P
EGFR mutation	1962 (10%)	4338 (11%)	**4176 (11.4%)**	**<0.0001**
ALK rearrangement	577 (3.3%)	1019 (3%)	896 (3%)	0.35
BRAF mutation	327 (1.8%)	**830 (2.4%)**	**692 (2.4%)**	**0.0001**
HER2 mutation	109 (0.6%)	**266 (0.9%)**	**252 (0.8%)**	**0.01**
ROS1 rearrangement	61 (0.9%)	133 (0.9%)	**126 (1.3%)**	**0.005**
KRAS mutation	**4717 (29.8%)**	9215 (28.2%)	7895 (27%)	**<0.0001**
Molecular drivers*	3037 (3.9%)	**6587 (4.4%)**	**6142 (4.4%)**	**<0.0001**

* *EGFR*, *BRAF and HER2* mutations, *ALK and ROS1* rearrangements; *KRAS* mutation excluded.

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Association Between Outdoor Air Pollution And Lung Cancer in Female Never Smokers

R. Myers,[1] M. Brauer,[2] S. Ladhar,[1] S. Atkar-Khattra,[1] J. Yee,[3] C. Ho,[4] A. Mcguire,[3] K. Grant,[3] A. Lee,[3] B. Melosky,[4] S. Sun,[4] M. Tammemägi,[5] S. Lam[1] [1]*Integrative Oncology, British Columbia Cancer Agency, Vancouver, BC/CA,* [2]*Medicine, University of British Columbia, Vancouver, BC/CA,* [3]*Thoracic Surgery, Vancouver Coastal Health, Vancouver, BC/CA,* [4]*Medical Oncology, BC Cancer, Vancouver, BC/CA,* [5]*Brock University, St. Catherines/CA*

Background: Long term exposure to ambient particulate matter ($PM_{2.5}$) has been associated with an increased risk of developing lung cancer, and is estimated to be responsible for ~23% of global lung cancer deaths. No current lung cancer screening risk prediction model uses air pollution as an individual risk factor in its risk calculation. As smoking rates decrease globally, and air pollution increases, it is important to assess the effect of long term outdoor air pollution exposure on lung cancer risk especially in never smokers. **Method:** We enrolled 421 patients with newly diagnosed lung cancer presenting to BC Cancer and conducted a detailed residential history from birth to estimate their air pollution exposure since 1996 when accurate high-resolution concentration estimates of $PM_{2.5}$ particulate matter derived from satellite observations and ground measurements became available. The average $PM_{2.5}$ exposure was quantified by combining residential histories with exposure data. **Result:** The demographics of the 262(62%) ever smokers, and 159(38%) never smokers with lung cancer are shown in Table 1. Median exposure of all cancer patients was 7.1 $PM_{2.5}$ ug/m^3 (IQR 6.8-7.3; Range 4.3-65.8). Of the ever smokers, 6.1% had a $PM_{2.5}$ >10 ug/m^3 whereas 15.1% of the never smokers had a $PM_{2.5}$ >10 ug/m^3. Among never smokers with lung cancer with high $PM_{2.5}$ exposure >10 ug/m^3, 74% were female and 83% were of Asian descent. Using a logistic regression model, we demonstrated a significant association between air pollution exposure and never smokers compared to ever smokers in women: Odds $Ratio_{per\_1\_LN\text{-}transformed\ unit} = 12.05$ ($p<0.001$). This association was absent in males (interaction $p=0.006$). **Conclusion:** In women with lung cancer, outdoor air pollution exposure was significantly higher in never smokers than in ever smokers. This association was not observed in men with lung cancer. **Keywords:** air pollution, never smokers, lung cancer risk

	Total n=421	Ever smokers n=262	Never smokers n=159
Sex (F/M)	52%/ 48%	45%/ 55%	64%/ 36%
Age (mean[SD])	67.6±7	68.9±6.5	65.9±7.8
Smoking Status	Ever: 62% Never: 38%	Former: 77% Current: 33%	100%
Family History of Lung Cancer	21%	29%	14%
Ethnicity	Caucasian:54% Asian: 34% Other: 12%	Caucasian:71% Asian: 18% Other: 11%	Caucasian:26% Asian: 61% Other: 13%
Place of Birth	Canada: 43% Foreign: 57%	Canada: 56% Foreign: 44%	Canada: 22% Foreign: 78%